STUDENT ESSAY

THE INFORMATION MISSION AREA: AN OVERVIEW

BY

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30 MARCH 1988

US ARMY WAR COLLEGE, CARLISLE BARRACKS, PENNSYLVANIA

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In May 1984 then Army Chief of Staff General John A. Wickham announced the formation of the Information Mission Area (IMA). This decision pulled together the disciplines of telecommunications, automation (to include office automation), visual information, records management, and publications/printing under a single management structure. The process of complying with the Chief's directive has gone relatively well despite some confusion and resistance. The purpose of this paper is to provide an overview of the IMA, place it in a basic

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THE INFORMATION MISSION AREA: AN OVERVIEW

An Individual Study Project
Intended for Publication

by

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ABSTRACT

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INTRODUCTION

Recently the Army has undergone a major reorganization of its information handling capabilities. Five subgroups, disciplines, comprise the new Information Mission Area (IMA). Initially, the IMA appears complicated and incomprehensible. It is complex, and trying to understand it can be overwhelming. This paper seeks to unravel the complexities of the IMA and make its fundamentals understandable. The discussion opens with an examination of the disciplines themselves, proceeds through a brief history of the IMA and then presents some of challenges facing it. To be fully understood, the IMA must be presented in a theoretical context. The development of a primary model for information as a part of the process of communication meets that requirement. This paper concludes with a look at some organizational adjustments that will be needed to bring the IMA to its full potential.

THE IMA DEFINED

The Information Mission Area is a capstone label for the five functional groupings in which information management for the Army takes place. Information management, simply, is the conducting and supervising of the means whereby an individual or organization gathers, processes, transmits and stores knowledge. Information refers to elements or pieces of know-

ledge that have been arranged in an order or fashion that has meaning for the owner or proponent. The balance of this paper rests upon these basic definitions.

DA Pamphlet 25-1, "Army Information Management," describes the five disciplines of the IMA as follows.

> Telecommunications: The transmission, emission or reception of signals, images, or sounds of any nature, by wire, radio, or television, or other electromagnetic means. Includes the use of microwave, satellite, electronic switching, and terminal systems to network information systems for transport of information.
>
> Automation: The use of computers to store, retrieve, manipulate, and control data. This includes the collection, processing, display, and output of data to produce or communicate information.
>
> Visual Information: The recording, design, production, reproduction, distribution, and presentation of visual or aural information. Includes still and motion picture photography, video, audio and graphic art products, services and equipment.
>
> Printing and Publications: Applies to the process of information composition and representation on media. This includes, but is not limited to, micropublishing, platemaking, presswork, photocomposition, and binding, for issue and distribution of information products.
>
> Records Management: Includes management of correspondence; reports; forms; directives and publications; mail; distribution; maintenance, use and disposition of recorded information; declassification of recorded information; and implementation of responsibilities under the Freedom of Information and Privacy Acts.

DA Pamphlet 25-1 uses the term telecommunications rather than communications to denote the transfer of information by electronic means. Communications is the word most commonly used throughout the the Army, but telecommunications is the more precise. This point is made in order to prevent confu-

sion with the concept of communication that will be introduced later.

One automation world exists now where two were before. On the one hand there were the people who performed their functions sitting at their desks. They produced documents using electronic terminal equipment and local printers. This function was the responsibility of the Adjutant General Corps. On the other hand were the operators and maintainers of large computer facilities. Most of these people belonged to the Computer Systems Command, a field operating agency under the Army Deputy Chief of Staff for Operations.[1]

Visual Information has always been the responsibility of the Signal Corps.[2] The photographer performing his combat documentation duties or snapping official photos is probably the most widely recognized member of this discipline, which also includes radio and television programming and graphic arts (slides and VU-graphs). Despite the different skills involved, members of this discipline share the mission of presenting information in the most appropriate form to enter the eye and ear of the audience. Then it is up to the individual audience member to process that information.[3]

Regardless of the media used to produce a record, Records Management is nothing more than a control function. Information gathered and stored on a document, whether it is paper, film, magnetic tape, disk, or computer memory, is a record needing management.[4] The function being performed is the key to understanding Records Management and not the media

used. Simply, it is "the proper application of proper management techniques."[5]

The provisions of the Privacy Act and Freedom of Information Act are subsets of Records Management. They control the flow of information only to those offices and individuals who must have access to properly process that information. For example, they assure that only the soldier and finance personnel working on that soldier's records have access to the pay information pertaining to that soldier.

"Publications and Printing is...the promulgation of information through the paper medium."[6] Having said that, however, it also "is a very highly technical area. They use computers, high speed communications, laser printers, (and) computer generated grahpics."[7] Lessons learned in this area apply throughout the IMA. Using function rather than tradition as a guide, Publications and Printing has used emerging technologies to save money. The best example in the commercial world is the newspaper, USA TODAY. It is far cheaper to ship information around the world electronically than it is by paper.[8]

Libraries are not listed in DA Pamphlet 25-1 as a discipline under the Information Mission Area. By following the logic where function, not tradition, was used to consolidate the disciplines of the IMA they should be. As systems, they are highly automated[9] and as an organized collection of information, they are databases. Information held in libraries are in graphic, print, aural, and magnetic media. From a

telecommunications perspective, they act as a delay in the transmission time between the originator and the recipient.

HISTORY OF THE IMA

A quick review of the history behind the Information Mission Area will put the challenges facing it into perspective. The mood of Congress in 1980 was to have each agency of the government consolidate its information management resources functions within a single office. To this end Congress passed Public Law 96-511, the Paperwork Reduction Act of 1980. It reaffirmed its intent through the Reauthorization Act of 1986.[10]

In 1983 Congress asked then Chief of Staff General E. C. Meyer how many tanks there were in the Army. In trying to get the information to answer Congress the General claimed he received seven different answers from the Army Staff.[11] It became obvious that the Army needed to bring the gathering, storing, verifying, and presenting of information under control.

In May 1984 General John A. Wickham, General Meyer's successor as Army Chief of Staff, announced the establishment of the Information Mission Area. He appointed Lieutenant General David K. Doyle to be the new Assistant Chief of Staff for Information Management and Lieutenant General Emmett Paige, Jr. to be the Commanding General of the U.S. Army In-

formation Systems Command (USAISC). This new command grew from the merger of the U.S Army Communications Command and the Computer Systems Command, a field operating agency of the DCSOPS of the Army. At the same time General Wickham also approved the creation of the information management infrastructure. This infrastructure gave the Major Army Command (MACOM) commanders a Deputy Chief of Staff for Information Management (DCSIM) and installation commanders a Director of Information Management (DOIM).[12] Under this concept the principle of unity of command would be applied to information management and the intent of Congress would be met as well.

General Maxwell Thurman, then Vice Chief of Staff of the Army, charged LTG Doyle with responsibility to bring the IMA into being and gave him an initial staff of less than twenty people. General Doyle's development staff contained no one experienced in the disciplines of the IMA, but he did have people who understood how the Army operated. Within ten days they had completed their work of defining the IMA, determining how the IMA should be structured, and how the command and staff relationships within the IMA should operate.[13]

The problems the development group found were organizational and functional, not technical. Technology itself was not a problem; the management of it was. Development was seen as going in the wrong direction. More emphasis would be needed on standardization, software, and development of information models. In the absence of a central focus, they found three centers of mass or environments--tactical/thea-

ter, strategic, and sustaining base. The concept of centers of mass was chosen to avoid the twin concept of boundaries. "Information doesn't know any particular environment."[14]

CHALLENGES FACING THE IMA

Another concept discussed involved distinctions of size. What is big and what is small as far as computers are concerned bears little relationship to ownership. The question became what is user operated and what is crew operated. Automated systems that could be operated by the user, regardless of size, would remain the user's responsibility. USAISC would be responsible for and would own equipment that required a crew to operate it and that supported an installation or larger facility.[15]

One decision made by the Doyle Group can be considered a breakthrough in the Information Mission Area. They determined that "responsibility for the creation of the information rests with the proponent of the MACOM."[16] The commander, the operations chief, the personnel manager would determine what information he needed to do his business. The information manager would not do it. This compares with the source, in the communication model to be discussed later, deciding what message should be sent to what receiver. The information manager assists by determining the appropriate or best channel to use.

Another major determination was that automation was not being managed on a worldwide basis. The mission to manage automation was given to the Information Systems Command (ISC), but the resources to perform the management functions were not.[17] Structural and organizational realignments will be needed to obtain the necessary manpower. Inadequate resources in terms of management personnel translates into difficulties in detecting, investigating, and resolving technical problems in managing information systems. A particularly acute area lies in automation security.

At the inception of the IMA there was insufficient workload in automation security to generate positions to transfer to the Information Systems Command from the MACOMs. Automation Security managment was being performed by security personnel, but it was only one of several functions being performed by one individual in the Security Office. Consequently, the manyears of work captured upon consolidation under the IMA produced fewer personnel than were needed.[18]

Another challenge facing the IMA is grade balances for civilians. Not only are there differences in grade authorizations among the disciplines, but also in the grades of the incumbents. Should an automator take on communications responsibilities at the GM 14 level, he or she faces a reduction in grade as soon as the communications workload becomes 51% of the total. Problems with experience differences also abound. Communicators have had more management experience by the time they approach the SES level than have had automa-

tors. Automators pay for having been technicians longer. They "don't have their strength in management."[19]

A not very different circumstance exists elsewhere in the IMA management community. "On the military side we have a branch functional area and, again, our tradition. Theoretically, if you were to graduate from college today and took ROTC, for example, you were commissioned and your degree was in computer science, you'd have to be commissioned in one of the branches, existing branches. If we follow the rules of the Army, you'd have to wait from five to eight years before you could get an assignment in automation. For someone graduating in 1987 from college with a degree in computer science to wait until 1990, '92 or '93 to get an assignment means you have on your hands a twenty-seven or twenty-eight year old, obsolete automator."[20] The selection rate to colonel looks good for automators because the automators being sought at the twenty-two year point in service have all retired. "There's no incentive for an automator to stay in."[21]

Thus far the discussion has focused on the echelons-above-corps part of the Army. The IMA applies to the corps and below Army as well. The functions remain the same, but the players have different names. At corps and division the Signal Officers provide telecommunications support. The Corps Automation Management Officer/Division Automation Management Officer (CAMO/DAMO) has responsibility for automation management at the corps/division headquarters. Records Management and Publications and Printing functions are the

domain of the G1.[22] All of these functions could be placed under the auspices of the respective signal officer to roughly parallel the DCSIM/DOIM arrangement.

The structural/organizational realignments needed at corps and division indicate that the biggest hurdle to be overcome is who is going to take charge of the Information Mission Area for the Army. This creates a very basic conflict within the Signal community. The Signal Corps occupies the best position to take charge of the IMA. Yet, Signal officers must change their self-imposed methods of operation. They have "a grand opportunity to...come out of...that perceived mold that they're technicians."[23]

Coming out of the technician mold means that the Signal Corps will have to recognize that there is more to communicating than providing the technical capabilities of the channel. Unfortunately, the Signal Center continues to prepare officers only for the technical or signals aspects of their duties. The program of instruction for the Signal Officer Basic Course contains only subjects related to technical telecommunications and automation. The words, records management, printing, and publications, do not appear in the program of instruction.[24] There is only marginal improvement at the Signal Officer Advanced Course. Students there are only exposed to the process of developing an Information Management Plan (IMP) for an installation. Out of a twenty week course only five hours are devoted to other subjects related to the IMA, not including the technical aspects of

telecommunications and computer operations. Three of those hours are spent on the administrative procedures for obtaining automation assets and two on automation security.[25] However, for the IMA to fully serve the Army as intended, it needs officers schooled and skilled in the broader world of communication.

A PRIMARY INFORMATION MODEL

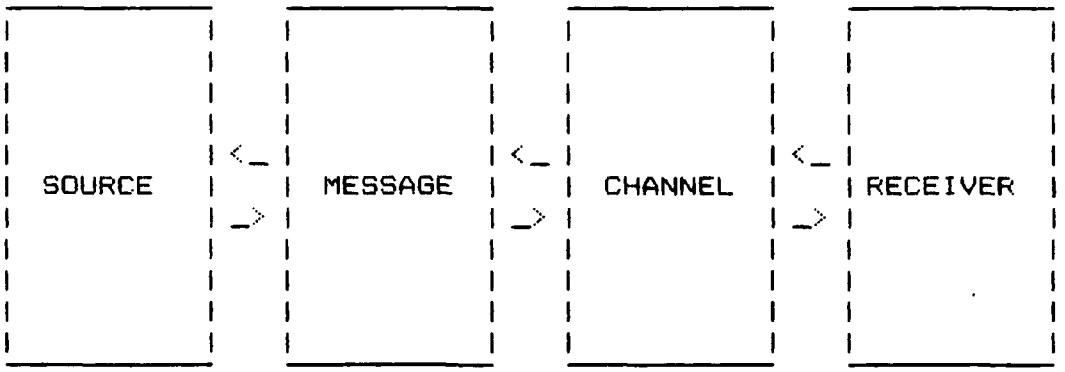
Historically, the disciplines of the IMA have been separated by their different technological bases. Today, they are seen as being parts of the communication process. It is this commonality which unites them. "Information transfer by any other name is communication."[26]

At its most basic level the process of communication has four key elements. Namely, a source who has a message to be sent by some channel to a receiver. Communication occurs when the source sends his message via some channel to the receiver and the receiver responds to the message in the manner desired by the source. This implies that a feedback mechanism of some sort is in existence and in use. It can also be expressed as the receiver who, upon receipt of the message from the source, becomes a source who sends his own message by some channel to a receiver, the original source.[27] As shown in Figure 1., communication occurs only when this full process takes place. Otherwise, it is only message passing.

The arrows in the model indicate the message flow.

FIGURE 1.

GENERAL MODEL OF COMMUNICATION



The following example should help make this process clear. Let's say you hear someone scream, "Incoming!" Immediately you dive for cover. In this instance the person yelling acts as the source; the message is the screamed, "Incoming"; the channel is verbal or voice; and you are the receiver. All the time the messenger is screaming only message passing takes place. Once you take cover communication occurs because you, the receiver, have acted in the manner expected by the source at the moment he screamed, "Incoming!"

Information processing starts with a requirement to build or add to a body of knowledge. This requirement is transmitted by voice, print, or electronic means. Bits and pieces of related knowledge, called data, are gathered from the universe of available knowledge and are compared with the originating requirement for sufficiency, accuracy, and com-

pleteness. Data meeting these criteria become information; the remainder are discarded, not destroyed, as they still exist in the universe.

Once the information has been processed, it is sent back to the source. This transmission may happen immediately or it may be delayed by storing the information. The means by which the information is returned will be aural, visual (print or graphic) or electronic. Except for voice, the same media will be used for storage.

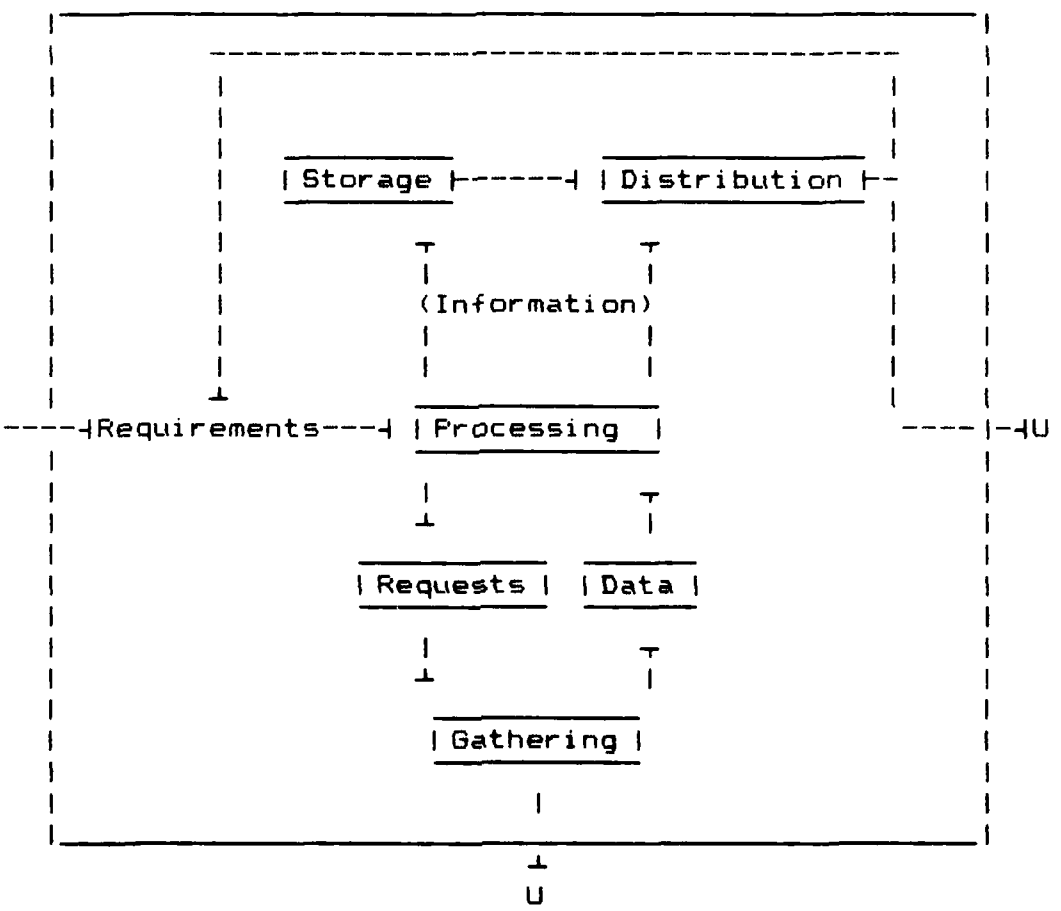
The model at Figure 2. depicts the process. The letter "U" represents the universe of all data that is available to any and all users regardless of their capability to retrieve it. The model is entered through the requirements stage. Each requirement received contains the format in which the requested information should be presented. At the processing stage the requirement is translated into a request to gather data from the continually generating universe. Once the requested data is gathered, it returns to the processing stage where it is matched against the format of the originating requirement. Data found to meet the requirement becomes information to be sent back to the source. The flow of information follows one or both of two paths. It may be transmitted directly to the source or it may be stored. As the information is distributed to meet a specific requirement, it also becomes data in the universe to be gathered and processed for some other source.

An expansion of the process of communication example

will show how information is created. The source, message, channel, and receiver remain the same and again someone yells, "Incoming!" Based upon training and prior experience, the receiver knows what conditions must be met in order to

Figure 2.

GENERAL MODEL OF INFORMATION CREATION



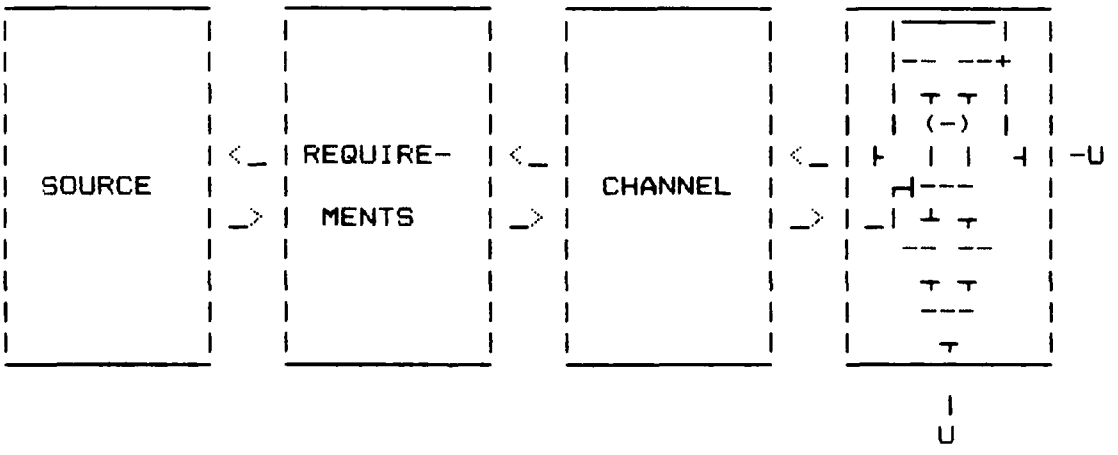
secure cover and recognizes that the message contains the requirement to seek that cover. Data gathered from the universe of possible sources of cover reveal a truck, ditch, and bunker. Quickly matching data and requirements, the receiver produces the information to take cover in the bunker. A se-

cond soldier, seeing the first dive into the bunker, dives in after him. In this instance, the information to dive into the bunker, processed by the first soldier, becomes data for the second, who also processes it into information upon which to act.

For the IMA to be seen in its proper perspective, it must be considered as a part of the communication process. Figure 3. combines the Model for Information Creation and the Model of Communication. The message block becomes the requirements block, which reflects that, as the source creates a message, he generates requirements. The requirements are passed to the receiver through the channel. What had been

FIGURE 3.

GENERAL MODEL OF COMMUNICATION
WITH INFORMATION CREATING ADDED



the receiver block in Figure 1. has been replaced with the model in Figure 2. This shows that the receiver matches the gathered data with the requirements to create information. The information is then stored or sent to the channel for

transmission back to the source. When the source sees that the receiver has responded in the manner desired, communication occurs.

The example of the response to the scream, "Incoming!" can also illustrate the whole process. The source, using the verbal channel, screams the message, "Incoming!" The receiver, recognizing the requirement to take cover, gathers data on the immediate availability of cover, creates the information that the bunker provides cover, and, dives into the bunker. At the moment the receiver dives into the bunker he responds as intended by the source and communication occurs. The creation and distribution of information are essential to the process of communication.

Inserting the technical support systems aspects of the IMA into the communication process adds another dimension. Conceptually, a technical support system, such as a radio, a computer, and the vast networks that connect them, extends the distance over which two humans may communicate or shortens the processing time needed for them to create information. The merging of telecommunications and automation technically, and functionally within the IMA, consolidates the properties of the two systems into a single entity. No amount of technological advancement or complexity in terms of transmission distance or processing time, however, will change the concept that a technical support system merely aids the process of communication between two humans.

The management and ownership of technical support sys-

tems lies with both the channel and the receiver. The distinctions between who owns what were made earlier in the discussion. The receiver owns it, if it is user-operated. The channel, such as the United States Army Information Systems Command, owns it, if it is crew-operated.

When technical support systems are used in the communication process, man-machine interfaces will be needed. The media used must be understandable to humans. That is, the media must be print, visual, or verbal. All operations within and between machines will be electronic.

In terms of the model in Figure 3. requirements will be received visually, verbally, or in print. Verbal and printed requests will be converted to an electronic format for entry into the automated Processing stage. Distribution of information will be by electronic, visual, verbal, or print media. Appropriate translation will be made to convert electronic information into other media. Storage will be electronic or visual, depending upon the degree of permanence required.

The disciplines of the IMA share the technology base of electronic processing of information. Automation and Telecommunications have had this commonality since their inception.[28] The advent of computer graphics has put Visual Information on the same plane. Similarly, electronic storage capabilities have made Records Management and Printing/ Publications equal partners in the IMA. In short what used to be major distinctions between these disciplines only exist as minor differences. Their overriding similarities--the

making of information in electronic format understandable to humans--have merged them.

PREDICTIONS FOR THE IMA

The future of the IMA lies in the organizational and functional realms. By the year 2003 the personnel management issues of the 1980's will have disappeared. Civilian career patterns will have been established to allow for an orderly progression from the entry levels to the most senior. Grade distribution inequities will have been removed as well. Techniques for assuring the competency of the civilian work-force will have been found and proven.

One such technique involves a swap with industry. Every fifth year of government service civilian members of the IMA will exchange places with a counterpart in industry. This will help to keep the government worker current in his skills and knowledge as compared to his career field at large. It also will permits industry to know how it can best contribute to effective government operation. Professional associations such as the Armed Forces Communications-Electronics Association (AFCEA) and the Association of the United States Army (AUSA) will form the medium through which government-industry exchanges take place.

Most of the changes in the civilian force structure will result from the application of rules and procedures existing

in the 1980's. In contrast, the changes in the officer corps will be a reversal of prevailing practices. The Army will be forced by the necessity of having in the IMA an officer corps that can lead and manage in an environment where the challenges have other than technical solutions. Assession programs will mark the first of the changes to be made.

As of 1987 the number of ROTC scholarships were known and tracked. The Signal Corps was particularly interested in its engineering assessions. However, the tracking ceased upon entry and what happened to these officers from a career progression perspective was not determined.[29]

As Congress pursues its examination of military expenditures, the following scenario could face the Army. In 1991 Congress will direct that a study be conducted to see if the results of Army ROTC scholarships justified their costs. The results of the study will find that the career development needs of electrical engineers are incompatible with the career progression pattern of Army officers. Engineers will be shown to follow one of two courses. Either they will stay in engineering positions and be schooled periodically to maintain proficiency in their field or they will progress through the standard leadership stages. Those who follow the latter path will be in the minority and for the most part they will lose currency in their field. Of those who attempt to follow the former path, they will be either wooed away by industry at the end of their initial commitment or they will go to industry upon nonselection for promotion to lieutenant colonel.

They cannot remain current in a world of rapidly changing technology, contibute to the Army as engineers, nor meet their obligations for Joint duty, and serve as a battalion S3 or executive officer while in the grade of major. Finding only two notable exceptions Congress will determine that the outcome is not worth the expense and they will direct the Army to review its priorities and to revise its procedures.

In another scenario Congress will direct the Army to restructure the Signal Corps. Congress will have recognized the need for technical expertise as a component of the IMA and it will have formed the Signal Command as a subordinate command within the Army Materiel Command. The Signal Command will have responsibility for hardware and software development, engineering, and installation for the IMA. The leadership structure will be a mixture of military and civilian and all of the technical work will be done by contract hires and through industrial contracts.

To perform all of the functions of the IMA the Army will form the Communication Corps. Not only will this command operate and maintain IMA systems for the Army, but also it will advise and guide the Army on the creation and distribution of its information. Proponency for that information will remain with the user. Accession requirements for the military and civilian leadership within the Communication Corps will have changed. People with humanities and business backgrounds will be sought in growing numbers. They will be selected also for their technical aptitude. The procedures will have

been adopted to assure the existence of leaders and managers who understand people and their communication needs and who have the ability to grasp the technical aspects of their duties and functions.

The United States Army Signal Center, and School at Fort Gordon, Georgia will be renamed the United States Army Communication Center and School. The majority of changes will take place at the School. The enlisted program of instruction will continue to produce technicians to operate and maintain the technical systems of the IMA. The thrust and scope of the courses taught at the officer level will change. Officers will be schooled in the process of communication from user to user. The program of instruction will be distributed among the human side of the communication process, the disciplines of the Information Mission Area as they pertain to the Army and the communication process, and the management of the technical systems within the IMA.

The Communication Corps will replace the Signal Corps. Even though the major organizations within the Signal Corps of 1988 will still be recognizable, the changes will be more than in name only. The changes will result from the need to manage the flow of Army information from the originator to the recipient and from the desire of commanders at each echelon of the Army to have one individual who will control and manage all of their information needs. The seeds of the Communication Corps were sown with the implementation of the IMA.

The Signal Corps will still exist; though its scope and size will be greatly reduced. The Signal Command, as it will be known, will be a subordinate command of the Army Materiel Command. To preserve the name "Signal" it will replace the Communications-Electronics Command (CECOM). It will perform all of the research and development tasks for the Army's Information Corps. It also will field and support all information equipment within the Army. This support will extend to the direct support maintenance and supply levels.

Throughout the Army other name changes will reflect realignments of functions and responsibilities. At the Department of the Army DIRM will replace DISC4. The Directorate for Information Resources Management will remain under the Secretary of the Army. The Director will write the standards for information management and establish the policies regarding information operations throughout the Army. He also will advise the Joint Chiefs of Staff on the Army's information resource applications and management.

The Director of Information Resources Management will also be the Commander, U.S. Army Commuication Command (USACC). He will have two principal deputies, the Deputy Commander, USACC and the Assistant DIRM. With headquarters at Fort Belvoir, Virginia he will be well placed to perform his duties and responsibilities.

Technological applications will have the greatest impact at the Major Army Command level and below. Each MACOM commander will have a Deputy Chief of Staff for Information Man-

agement (DCSIM) and each Installation Commander will have a Director of Information Management (DOIM). These individuals also will be commanders in their own right within the USACC structure. The merging of the discrete disciplines of the IMA will permit the DCSIM and DOIM operations to be fully staffed, but at a lower density than is possible today.

The typical subdivisions of the DCSIM/DOIM will be Plans and Operations, Security, Administration, and Resources. Functionally, the Security, Administration, and Resources divisions will remain unchanged. Technology will have impacted in the Plans and Operations division. Its subdivisions will consist of Termination/Presentation, Transmission, Freedom of Information and Privacy Acts, and Plans branches. It is upon this grouping of functions that the Signal Corps had to be renamed the Communication Corps. The scope of responsibilities are too broad to be kept under the technical heading of signals.

Organization of the Operations Division will be along the lines of the Communication Model presented above. The Termination/Presentation Branch will be concerned with the communication requirements of the users, both as sources and as receivers. The Transmission Branch will have the responsibility to move information between users by some channel. They also will be responsible for the retainabilty functions pertaining to information management. The Freedom of Infor-

mation and Privacy Acts Branch will assure that all messages will be treated in accordance with applicable statutes.

CONCLUSION

This paper has reviewed the Information Mission Area from a very basic perspective. The organizational and functional problems presented are not a complete list nor are they intended to be. They serve to show where the major challenges lie and where the most resources will have to be applied in the future to bring the promise of the IMA to fruition. Some essential realignments in structure and orientation will assure that information, one of the Army's primary resources, will be most effectively managed and employed in the future.

ENDNOTES

1. Interview with Mr. Ron Craven, 20 November 1987. Were the title "IMA Program Manager" to exist, Mr. Craven would have it.

2. Ibid.

3. Ibid.

4. Ibid.

5. Ibid.

6. Ibid.

7. Ibid.

8. Ibid.

9. Ibid.

10. Ibid.

11. Ibid.

12. Ibid.

13. Ibid.

14. Ibid.

15. Ibid.

16. Ibid.

17. Ibid.

18. Based upon the author's experience while serving as the Assistant Deputy Chief of Staff for Information Management, Military District of Washington and as the Chief, Operations, Plans, Training, and Security, United States Army Information Systems Command-Operations Command from July 1985 to May 1987.

19. Craven, op. cit.

22. Craven, op. cit.

20. Ibid.

21. Ibid.

22. Ibid.

23. Ibid.

24. U.S. Army Signal Center and Fort Gordon, Program of Instruction for Signal Officer Advanced Course, (Fort Gordon, GA: 7 May 1986), pp. 27, 51, and 83.

25. U.S. Army Signal Center and Fort Gordon, Program of Instruction for Signal Officer Basic, (Fort Gordon, GA: 30 October 1986), pp. 1-107.

26. Craven, op. cit.

27. David R. Berlo, The Process of Communication: An Introduction to Theory and Practice, (San Francisco: Rinehart Press 1960), p. 41 and Wilbur Schramm in C. David Mortensen, Communication: The Study of Human Interaction, (New York: McGraw-Hill Book Company, 1972), pp. 40-41.

28. Craven, op. cit.

29. Ibid.